

BATTLE CREEK: A STUDY IN URBAN GEOGRAPHY

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PART I. PRESENT-DAY CITY AND FUNDAMENT

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INTRODUCTION

IN THE southernmost part of Michigan there are two lines of cities, each located along what originally were Indian trails and what today are highways radiating from Detroit (Fig. 1). The line farthest south on the map is composed of small market towns, most of them of less than ten thousand population. Here trade is the dominant industry, and what manufacturing exists came late in the history of the city and is still generally of only secondary importance.¹ The second line of cities, immediately north of the first, is composed of somewhat larger urban units, of which Battle Creek is one, and here manufacturing rather than trade is the principal function. Nor did manufacturing come late in the history of these cities. Generally it was the function around which the city was planned.²

Perhaps the two most outstanding characteristics of Battle Creek are: first, that it is so well known, which is unusual when its size, less than fifty thousand population, is considered — many cities a great deal larger are much less well known; and second, that its two major industries, the production of cereal preparations and the activities of the sanitarium, are so little related to the surrounding area. Its location in the southern part of the Hay and Dairy Belt³

¹ An example of this is Hillsdale. See Straw, H. Thompson, "Hillsdale: An Urban Study of a Small Mid-Western Town," *Journ. Geog.*, 34: 324-334. 1935.

² Davis, D. H., "Significant Geographic Problems of the Outwash Plains of Southeastern Michigan," *Journ. Geog.*, 21: 51-53. 1922.

³ Baker, O. E., "Agricultural Regions of North America. Part V, The Hay and Dairy Belt," *Econ. Geog.*, 4: 44-73. 1928.

places it outside the major areas producing its raw materials, and its proximity to the large urban markets is an advantage shared by many another near-by city. Even more peculiar is the location in this particular city of a health resort. The average American is accustomed to associate health centers with mineral springs, watering places, or seashore and mountain scenery. Battle Creek has none of these. The explanation will have to be found in the evolution of the city rather than in its environs.

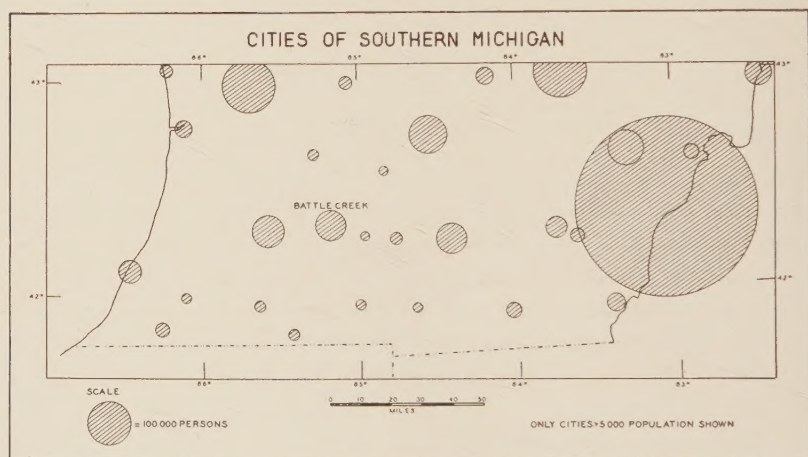


Fig. 1

PRESENT-DAY CITY

Battle Creek occupies a valley about three quarters of a mile wide (Fig. 2).⁴ In southern Michigan one is accustomed to a glacial terrain, rough in surface and complex in pattern, and the relatively flat land of the valley bottom, simple in design and bounded by clear-cut limits, serves sharply to differentiate this site from the areas of glacial deposition to the northwest and the southeast.

Two rivers, the Kalamazoo and the Battle Creek, meet here near the center of the city. Both rivers are surprisingly small in relation to the size of the valley, which, though continuing at about the same width, is occupied above the confluence by the smaller of the two streams, the Battle Creek. The Kalamazoo River, on the

⁴ Battle Creek Quadrangle, Michigan, U. S. Geol. Surv.

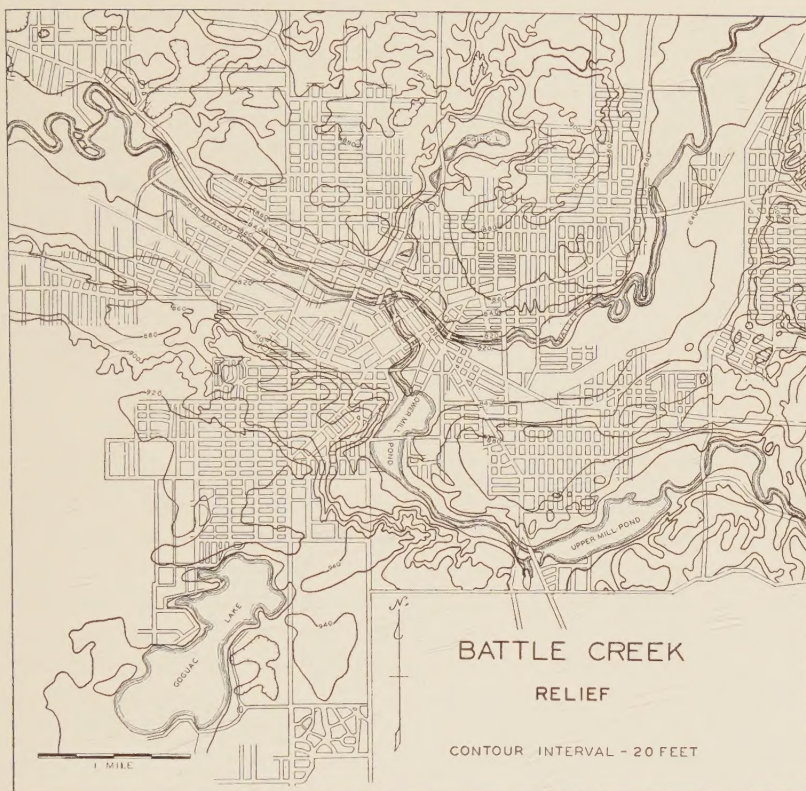


FIG. 2

other hand, above the Upper Mill Pond flows through a valley which is in proportion to the size of the stream. Near the confluence both rivers are confined within the smaller *thalwegs* which they have cut in the larger valley. Upstream the Battle Creek and downstream the Kalamazoo present a different appearance — the flow is less rapid and there are numerous bends and oxbows. Associated with these meanders are large stretches of poorly drained land (Fig. 3).

The valley sides, although in general much more sharply defined than the surrounding glacial area, have many irregularities along them (Fig. 2). The slope which drains Spring Lake, in the northern part of the city, is an excellent example. The lake itself is about a mile from the edge of the valley side, and yet its drainage basin is

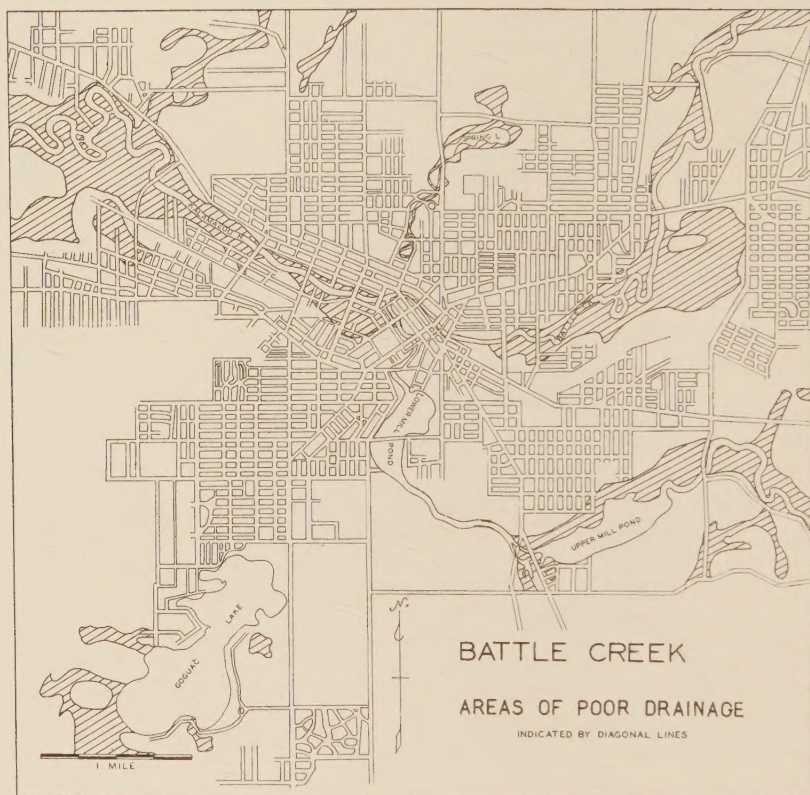


FIG. 3

but little above the general level of the valley floor. The boundaries of the sides vary in sharpness from place to place. In the eastern part of the city they are fairly clear cut, but on the southern slope of the northwestern part of the valley they are very poorly defined.

As the city has outgrown its valley it has expanded upon the higher lands to the north and the south. Here the terrain is distinctly one of glacial origin. Boundaries of any sort are absent, and complexity of surface and of structure is the rule.

STREET PATTERNS

The street pattern of the valley portion of Battle Creek is in harmonious relation to the landforms (Fig. 3). There are five prin-

cipal streets: two which enter from the northwest, one from the northeast, one from the east, and one from the south. These connect Battle Creek with Kalamazoo, Bellevue, Marshall, and Athens, respectively. There are a convergence and a crossing of these routes; the convergence is the result of following the more easily traversed valley floor and avoiding whenever possible the ascent of the valley sides, and the crossing occurs at the better-drained area in the center of the city.

The streets of the higher glacial section are of the rectangular grid pattern characteristic of urban centers laid out in the nineteenth century.⁵ Streets which seem to fit into neither of these two groups are mainly those which serve as connecting links between them.

THE ARRANGEMENT OF FUNCTIONAL AREAS

Industry

As one approaches Battle Creek from the higher land one sees in the valley a bristling of smokestacks and water towers, so common to the American manufacturing scene. This picture is most strikingly developed, however, before an impending storm at times when the wind is in the southeast, for then a pall of smoke drifts over the city and seems from a distance to form an unbroken canopy.

The factories are located almost exclusively upon the valley floor (Fig. 4). Here they are in close proximity to the principal roads of the valley and to the railroads. There is a definite division of factories on the basis of size. Those industries close to the commercial core tend to occupy smaller areas, whereas those at some distance generally cover larger units of ground. A scattering of factories, such as one might find in many cities, produce a variety of goods, but the rest may be divided into two distinct groups, the food factories and those making metal products. The food factories are the Battle Creek Food Company, the W. K. Kellogg Company, the Postum Company, and a branch of the Ralston Purina Company (Pl. I, Figs. 1-2). Among the metal-working factories are a few foundries, but these are small. Most of the metal-working industries produce such machinery as bread-wrapping devices, farm appliances, printing presses, and steam pumps. There are also smaller metal products — lawn sprinklers, registers for heating systems, registering machines,

⁵ James, P. E., *An Outline of Geography* (Boston: Ginn and Company, 1935), p. 188.

and wire crates and grids. Many of these metal-working factories differ from the food factories in location and in architectural design: their location is usually near the commercial core and the center of the city, and their architectural style is generally less modern (Pl. I, Fig. 3; Pl. II, Fig. 1). Apparently most of them are of earlier origin and existed in the city prior to the growth of the food factories.

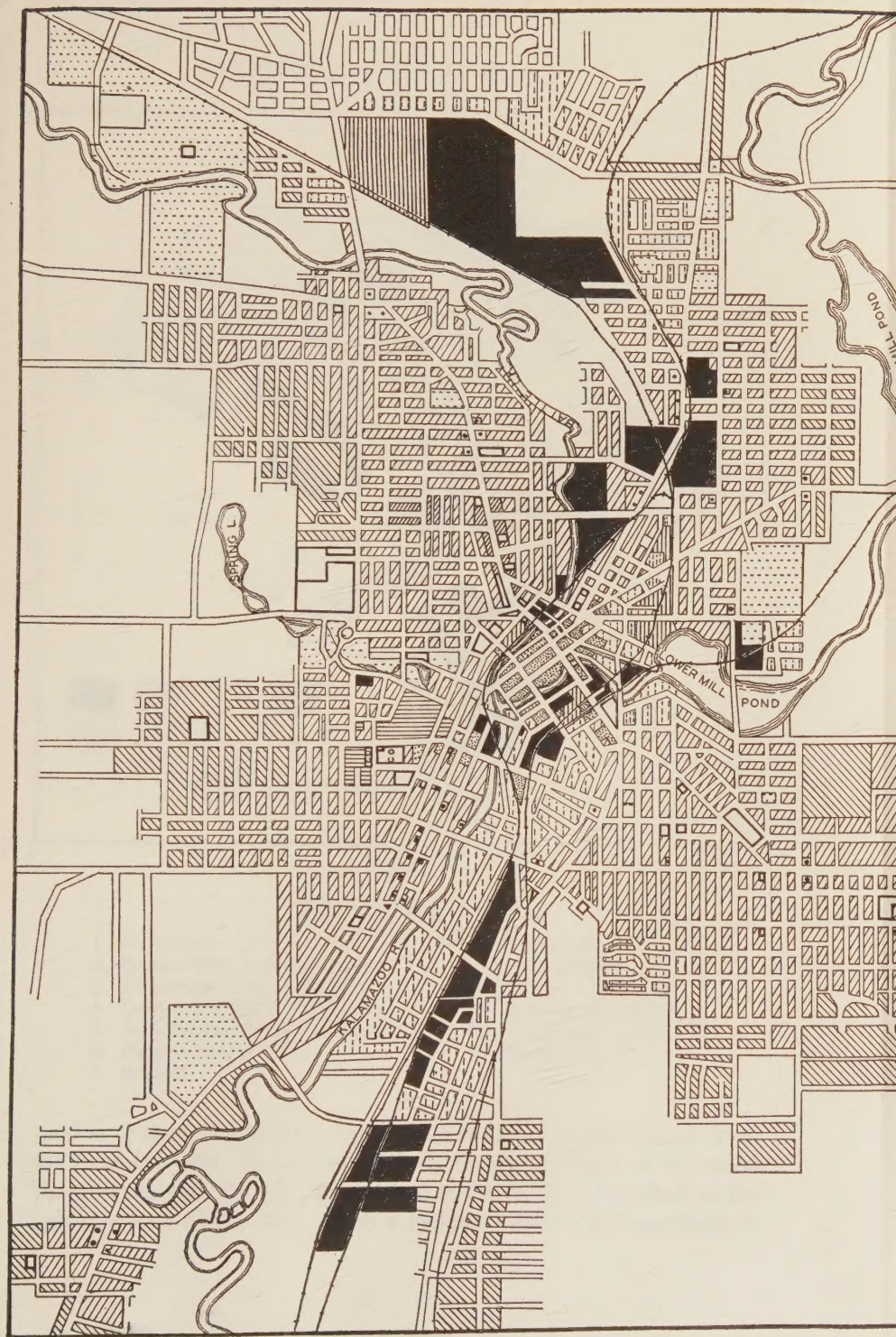
Commerce

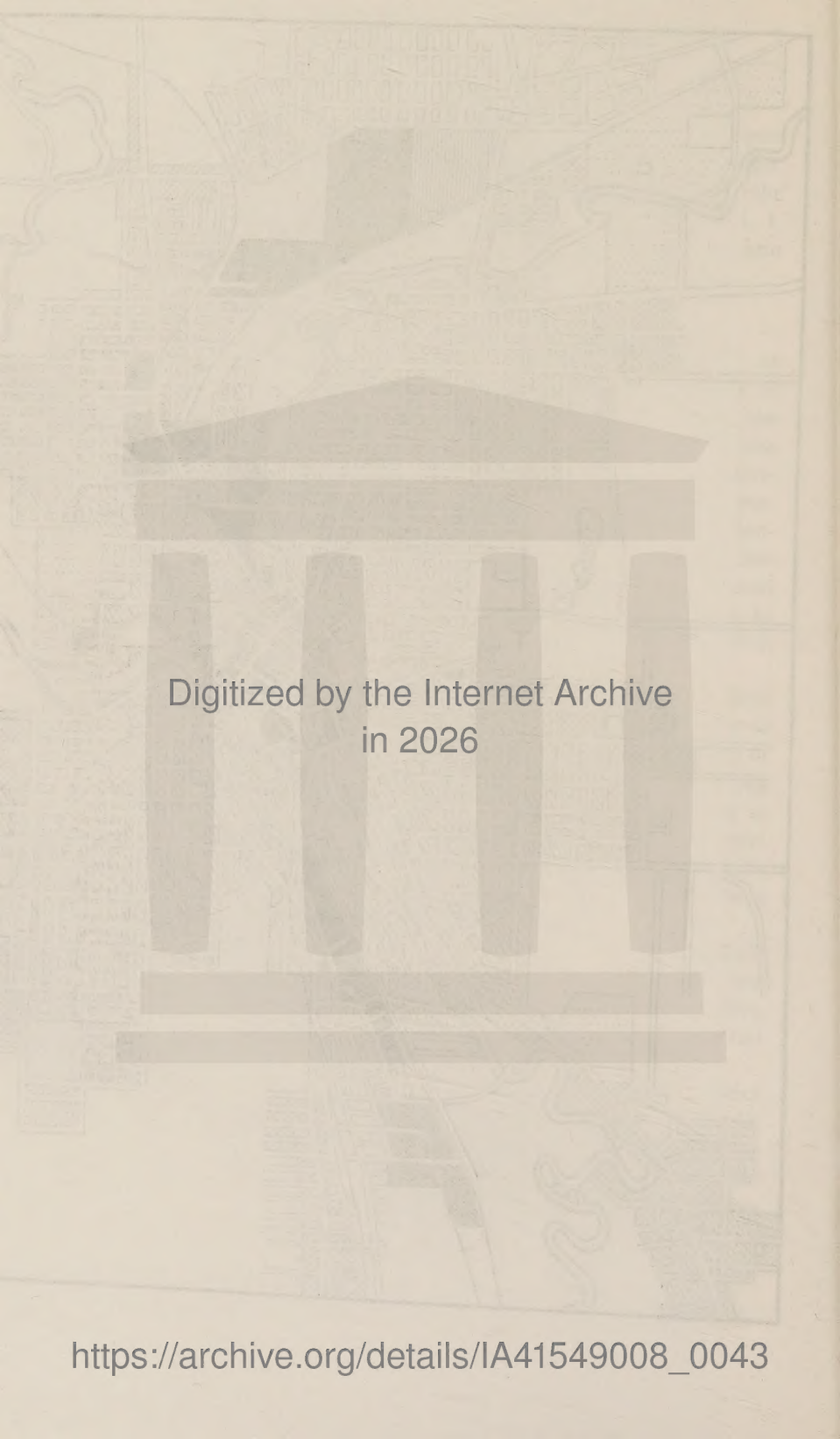
The commercial core is located near the center of the city, at the chief intersection of routes. There is considerable diversity of form within this core itself (Fig. 5). The principal street and the adjoining areas are occupied by the first-class commercial section (Pl. II, Fig. 2). This section contains most of the apparel, department, furniture, and jewelry stores, and constitutes the shopping area. The second-class commercial district (Pl. II, Fig. 3) extends in a broken ring about the shopping district. It is composed of stores of less pleasing appearance — building-supplies, grocery, and secondhand stores, with small restaurants predominant. The single exception to the generally poor appearance of this area is furnished by the often attractive automobile salesrooms.

There are two types of industry in the commercial core. The first is that, already mentioned, which is usually associated with one or the other of the two rail lines that traverse it. The second consists of a combination of local retail and manufacturing, such as shops selling office supplies and stationery in the front and doing job printing in the rear and bakeries which have small retail shops in the forepart of the buildings. This combination is distributed throughout the second-class commercial area and often at first sight seems to be a part of it (Fig. 5).

Throughout the commercial core there is a scattering of public buildings, and surrounding it is a ring of second- and third-class residence districts. Although not true in all cases, the third-class residence seems to be generally associated with industrial or rail districts.

Outside the commercial core and within the residence district there are also small isolated areas devoted to commerce (Fig. 4). The stores of these areas are small and, generally, are food or drug stores or restaurants, the primary purpose of which is to serve the immediately surrounding residence area. There is a definite concen-





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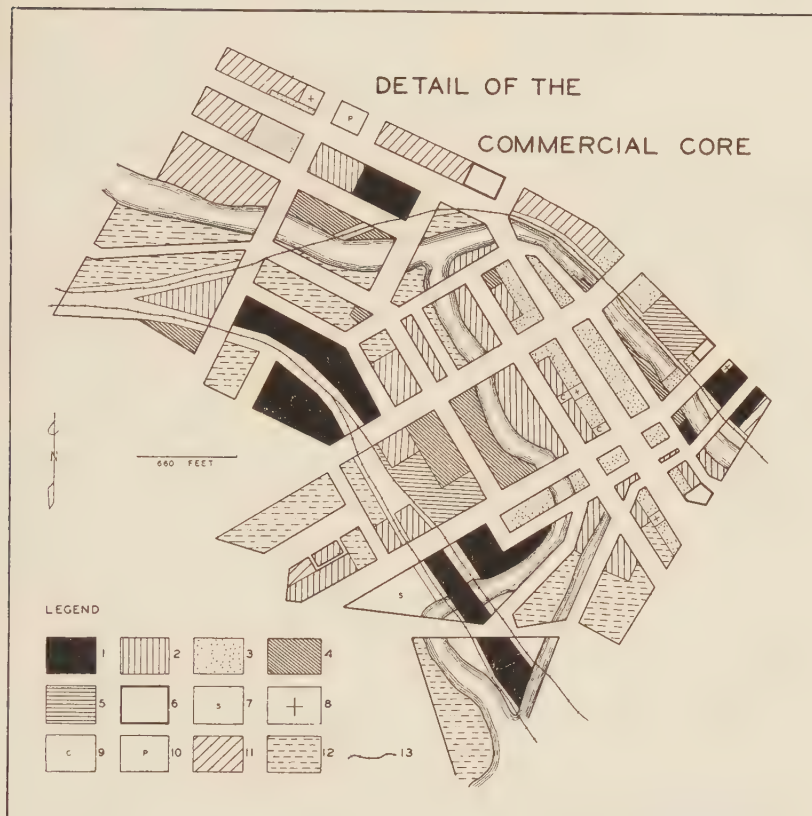


FIG. 5

KEY TO SYMBOLS

- | | |
|-----------------------------------|----------------------------|
| 1. Industries | 8. Churches |
| 2. Second-class commercial core | 9. City property |
| 3. First-class commercial core | 10. Parks |
| 4. Local retail and workshop | 11. Second-class residence |
| 5. Area devoted to transportation | 12. Third-class residence |
| 6. Public buildings | 13. Railroads |
| 7. Schools | |

tration of these commercial areas along the main traffic arteries leading from the city. This is particularly true of the road to Verona in the northeastern (Pl. III, Fig. 1) and of the road to Marshall in the eastern parts of the city. Such a location enables the merchant to

be the first to offer services and goods to those arriving and the last to offer them to those leaving.

Along the northern road to Kalamazoo, in the western part of the city, is a broken string of outlying commercial areas. This is a "string-street"⁶ development and may very well mark the direction of greatest future expansion of the commercial core itself.

Sanitarium and College

In the western part of the city, upon the land immediately north of the valley, are the sanitarium and the college. The sanitarium is of considerable size (Pl. III, Fig. 2) and rises above the surrounding neighborhood. It is capable of housing some twelve hundred patients. The college, on the other hand, is small, having an enrollment of only about three hundred and fifty students. A few of the buildings are of recent origin (Pl. III, Fig. 3), but the main ones are of a much older style of architecture. Not only are the buildings of the sanitarium and the college in close proximity, but certain ones are for the joint use of both institutions.

Transportation

Intimately connected with the commercial core and the factories is the area devoted to railroad transportation (Fig. 4). Battle Creek is served by both the Grand Trunk Railroad and the Michigan Central Railroad. The area devoted to transportation is unusually large, owing to the location within the city of engine and repair shops of the Grand Trunk Railroad, of which Battle Creek is the divisional center.

The rail lines are laid in the valley section of the city. The Grand Trunk, which enters from the northeast, uses the valley in which the Battle Creek is located. The Michigan Central, which enters from the east, curves northward at the edge of the city, thus avoiding the slight increase of grade which it would have were it to straighten its line (Fig. 2). This same railroad makes another northern bend in the center of the city. West of Battle Creek both railroads occupy the valley. The line which runs south of the city is a branch line and is of relatively small importance.

Besides transportation by rail the city possesses another kind, that by air. The airport is located some distance west of the city. Battle

⁶ McKenzie, R. D., *The Metropolitan Community* (New York: McGraw-Hill Book Co., Inc., 1933), pp. 254-256.

Creek is on the air route from Chicago to Detroit, and planes stop regularly for passengers.

Residence Areas

Occupying for the most part the higher land north and south of the valley with its factories and commercial core is the residence district (Fig. 4). Residence in the built-up urban area has been divided into three classes, upon the basis of general appearance. The author's field work was done during the years 1934 and 1935. At that time five to six years of the economic depression had passed. This meant that many homes went unpainted and had unkept yards. In some areas the condition presented no trouble in classification, but in others, where the homes were themselves simple frame buildings of unpretentious styles of architecture, there was great difficulty. Many of these homes, if well taken care of, would be called second-class residence. As they were, however, they had the appearance of being third-class. In the end it was decided to classify them as they would probably be under more normal economic conditions. However, there is no assurance that this aim was always attained.

Third-class residence is generally in close proximity to the factories, the railroads, or the commercial core. That portion associated with the commercial core appears, in part at least, to be decadent (see Pl. IV, Figs. 1-2). Other sections of third-class residence immediately southwest of the commercial core contain a large number of the Negro population. Since there are in Battle Creek no zoning ordinances which segregate the races, the homes of whites and Negroes are intermingled.

First-class residence (Pl. IV, Fig. 3) occupies a very small portion of the residence area. This is explained in part by the location of what will probably develop into first-class residence in the present suburban residence districts (Pl. V, Fig. 1), particularly in the area in the northern part of the city. There is a similar development southeast of Goguac Lake. The first-class residence northeast of the commercial core is the oldest. Although it is still a residence area, that part of it nearest the commercial core is slowly being transformed. The first house at the right in Plate IV, Figure 3, has been turned into an apartment house, the second into a hospital. Farther down the street another is now used as a church. However, the change is slow and not extensive.

Second-class residence occupies most of the residence area (Pl. V, Fig. 2). The suburban residence (area which is less than 50 per cent built up) forms a broken ring about the periphery of the urban residence district.

Scattered throughout these residence areas are public buildings, mostly schools and churches. There are only a few parks, and these are small. In general, the larger parks of the city lie outside the residence area and are of recent development.

One special type of residence, the summer-cottage, occurs on the shore of Goguac Lake. Its extent is small, since much of the lake frontage is given over to a public park and a golf course, and it has contributed little to the growth of the city.

Parks, Subdivisions, and Vacant Land

We have already noted the presence of a few small parks and public grounds scattered throughout the residence areas. Most of these are used either to commemorate some spot of importance in local history or as playgrounds. At the outskirts of the city are larger parks. These appear to be of more recent origin and are designed for recreation.

Surrounding the city, and particularly well developed to the west, are areas of subdivision. Such areas are normal to almost every American city, but here they seem somewhat out of proportion to the size of the city itself. There are approximately three and one-eighth square miles which are practically unused either by the city or for agriculture.

Within the political limits of the city nearly one half of the land is vacant (indicated by white on Fig. 4). In general, two factors explain this: the presence of wasteland associated with the natural drainage of the city and the extension of the city limits to include agricultural land. The wasteland strongly corresponds with the areas of poor drainage (Fig. 3). Although, as can be seen by a comparison with Figure 4, the urban area has in most places pushed toward this undrained section as far as possible, there is much which still remains. The greatest amount of agricultural land within the city limits occurs in the northwestern part. Here it is apparently the result, not of the overambition of the city to acquire territory, but of the natural difficulty of fitting straight lines to the irregular pattern of actual urban use.

FUNDAMENT

That certain parts of the general pattern of Battle Creek are closely related to the underlying landforms and drainage has already been noted. Still other parts represent relict forms of earlier occupation, many of which were also related to the terrain in terms of the then usual mode of settlement. Therefore, to arrive at a complete understanding of the city, it is necessary to study the fundament of both its site and its surroundings.

LANDFORMS AND DRAINAGE

Battle Creek and the area surrounding it lie in that part of the United States affected by the glaciers of the Pleistocene period. The underlying Waverly shale and Marshall sandstone⁷ have been so deeply covered by glacial till that they are present at the surface in but few places. Small areas are in evidence where old glacial drainage channels have severely eroded the glacial material (Pl. V, Fig. 3). Otherwise the surface structure is almost entirely a product of glacial deposition.

Although three ice lobes invaded southern Michigan⁸ only two, the Lake Michigan and the Saginaw, affected the region about Battle Creek (Fig. 6). The deposits of the third lobe are found farther to the east. Deposition from all lobes occurred during the latter part of the Pleistocene period. A change of climate produced a condition in which the rate of melting exceeded the slow advance of the sheet, and recession took place. Apparently this change from an ice-age climate to something approximating that of today was not a slow, continuous process, but one of fluctuations, for the moraines about Battle Creek exhibit too much relief to have been deposited while the glacier was receding. Rather it would seem that during the short periods of relatively greater cold and precipitation the glacier advanced slightly, and that at the culmination of each short advance a moraine was laid down.⁹ This movement and deposition was repeated again and again. The spaces between moraines were generally filled with outwash or, where the retreat of the glacier was more regular, with ground moraine.

⁷ Rominger, C., "Geology of the Lower Peninsula," *Geol. Surv. Mich.*, 3, Part I (1873-76): 69-70. 1876.

⁸ Leverett, Frank, and Taylor, Frank B., "The Pleistocene of Indiana and Michigan," *U. S. Geol. Surv., Mon.* 53, p. 24. 1915. ⁹ *Ibid.*, pp. 30-32.

The pattern of the various landforms of today is shown on Figure 6. It cannot be assumed that the outlines of the present-day formations more than approximate the original ones. These formations are a part of an area of unusually complex glacial deposits.¹⁰ Much of the outwash plain is not associated with the moraines im-

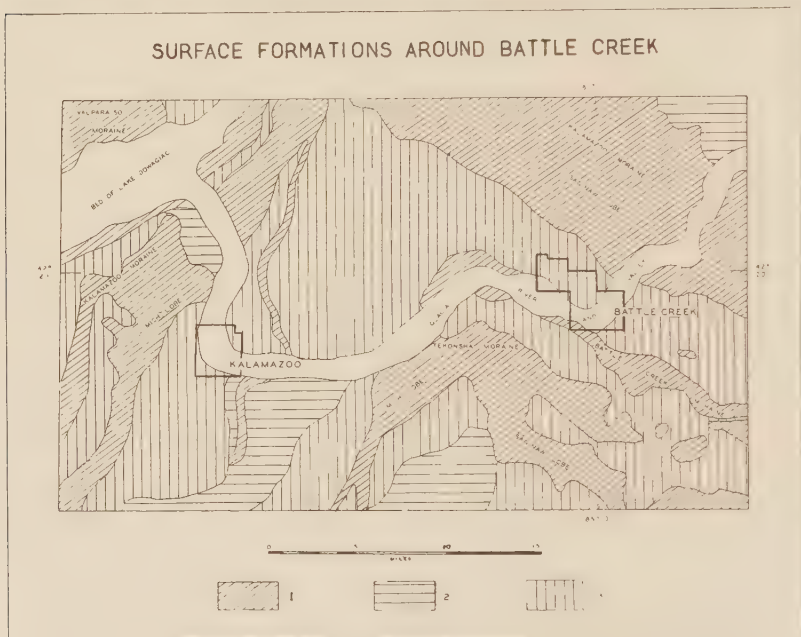


FIG. 6

KEY TO SYMBOLS

1. Moraines 2. Till plains 3. Outwash plains

(After Frank Leverett, "The Country around Camp Custer," *U. S. Geol. Surv.*, Fig. 3. 1918.)

mediately to the north or the west but with those farther away. The glacial streams which deposited the outwash have in many places severely eroded moraines which were formed earlier and which lay at some distance in front of the glacier. At other times the outwash was deposited over the moraines and the till plain, so that many areas designated as outwash on the map may be underlain by earlier and differing deposits.

¹⁰ Davis, *op. cit.*, pp. 50-57.

The first morainic system produced within the area shown on the map was the Tekonsha moraine. It takes the form of an inverted V, with the apex just north of the glacial river valley and northwest of Battle Creek. This moraine, the product of the combined deposition of both the Lake Michigan and the Saginaw lobes, has its re-entrant angle about five or six miles west of Battle Creek. The portion of the moraine which lies north of the glacial river valley is a part of the interlobate deposits which were formed between the Lake Michigan and the Saginaw lobes during the later stages of ice withdrawal.¹¹ In land surface it differs somewhat from the rest of the Tekonsha moraine. Its relief is produced largely by depressions and basins, whereas that of the remainder is caused mostly by ridges and knobs. Large parts of the moraine have been greatly modified by outwash deposition which occurred after the moraine had been laid down by the glacial lobes. One can surmise the earlier existence in many places, especially toward the south, of a more extensive moraine. This surmise seems borne out by the boulder deposits in some of the adjacent outwash areas.

The moraine deposited immediately after the Tekonsha was the Battle Creek. It might perhaps be better to consider the Battle Creek a part of the Tekonsha, since it was at the time of its deposition that the previously mentioned interlobate moraine was laid down. The Battle Creek is, however, a distinct moraine and is separated from the Tekonsha by an outwash plain from one to two miles in width, sloping gently to the south. It is cut off at its southeastern end by the outwash deposited later from the Kalamazoo moraine, and the northwestern end has been eroded by the glacial river, the valley of which is now occupied by the Kalamazoo. At this end the outwash plain is at the same elevation as the moraine and can be differentiated from it only by a less rolling surface and a smaller deposition of boulders. As one travels toward the southeast, however, the difference in elevation of the two deposits becomes more and more apparent. This difference is brought about not by an increase in the elevation of the moraine but by the gentle drop of the general level of the outwash. There is also a gradual change in the type of deposit of the outwash. The larger particles, the gravels and coarse sand, tend to be more abundant in the northern part, whereas finer material is more abundant in the southern.

¹¹ Leverett and Taylor, *op. cit.*, pp. 152-153.

The moraine deposited next, and separated from the earlier Battle Creek moraine by an outwash plain of considerable size, was the Kalamazoo. The elevation is greatest near the reëntrant angle and decreases as one approaches that part eroded by the glacial stream. The general surface is of the knob-and-basin type. The numerous small lakes near the reëntrant angle are replaced by numerous swamps near the channel.

This old glacial channel occupies for the greater part of its course one of the most extensive outwash plains in southern Michigan. The plain has a very definite southward slope; the elevation at the reëntrant angle of the two Kalamazoo moraines is about one thousand feet and drops to about eight hundred feet at the Michigan-Indiana border. The larger gravel particles, as has been mentioned before, are deposited in the north, and the finer materials in the south. From both the slope and the size of particles deposited it would seem that the general trend of glacial drainage on the outwash was southward. Still, the valley occupied by the Kalamazoo River, itself a part of the glacial drainage of this time, travels at right angles to the general trend. Indeed, north of the city of Kalamazoo it turns and continues in a direction exactly opposite to the general trend. Another peculiarity of the valley, as stated before, is the fact that while large parts of it are obviously the result of stream erosion, there are sections of the bluff the outlines of which are so irregular that this general explanation fails to solve the problem of their forms. Examples of this irregularity have been offered within Battle Creek itself.

The only possible solution to this apparent discrepancy seems to be that the old glacial stream followed not a self-made valley but one which, at least in part, had been prepared for it by a series of pits ¹² in the outwash. These pits had resulted from the melting of large blocks of ice deposited by the glacier, and they formed the rudiments of a valley which the glacial stream followed and widened. This explains the fact that the direction of the stream differs from the usual one of its time and that its valley sides are so filled with irregularities.

The present Kalamazoo River is a much-underfit stream after reaching the glacial drainage channel and has produced but a narrow, wandering thalweg and a few swamps. It has in scarcely any place modified the valley bluffs of the earlier and larger stream.

¹² Leverett, Frank, "The Country around Camp Custer" (article on reverse side of topographic map "Camp Custer Quadrangle," edition of 1918).

Aside from those which occupy former glacial drainage channels, the streams are for the most part consequent ones which have adapted the direction of their flow to the slope of the glacial deposits. The complexity of the slopes of the deposits is reflected in the frequent changes of direction of the rivers. In detail, one finds lakes which drain in two directions and rivers which trace a tortuous pattern across the terrain. On a traverse of the area one meets the same river in many different and unexpected places. In general, however, the tendency of most rivers is to occupy the outwash and to avoid the till plains and, especially, the moraines.

Associated with the streams are numerous small lakes and swamps, also attesting the early youth of the area.¹³ The lakes are of several origins, but those near the city of Battle Creek are most frequently of the pit type, as, for example, Goguac Lake, southwest of the city.¹⁴ Many of the swamps are doubtless the relict forms of earlier lakes. With their heavy growth of grasses they were the popularly called "wet prairies" of pioneer days and the frequent, though often unfortunate, sites of early settlement.

The presence of these numerous swamps and lakes has caused a fairly even regimen of stream flow throughout the area, and thus any possibility of heavy seasonal floods is eliminated. This even regimen was of importance in former days, also, when the use of water power in Battle Creek was more extensive. Late summer ordinarily brought no great diminution of water supply, and thus the period within which manufacturing was possible was not curtailed.¹⁵

VEGETATION

The vegetation which covered the surrounding country at the time the first settlers came to Battle Creek, although in general determined by climate, in detail is closely related to the various surface forms. The climate of the area places it in the Dfa¹⁶ classification and consequently identifies the natural vegetation as a part of the deciduous broadleaf forest of the middle latitudes. The dominant association is oak-hickory. This has been classified as a xerophytic

¹³ Davis, C. M., "The Hydrographic Regions of Michigan," *Pap. Mich. Acad. Sci., Arts, and Letters*, 16 (1931): 211-215. 1932.

¹⁴ Scott, I. D., "Inland Lakes of Michigan," *Mich. Geol. and Biol. Soil Surv.*, Publ. 30, Geol. Series 25 (Lansing, 1921).

¹⁵ Lane, A. C., "Water Resources of the Lower Peninsula of Michigan," *U. S. Geol. Surv., Water Supply Paper* 30, 1899.

¹⁶ Köppen classification.

phase of the Appalachian Forest.¹⁷ Such a classification seems borne out by the fact that the oak-hickory association changes to a maple-beech association where the upland soil is heavier and of greater clay content,¹⁸ and where, consequently, the amount of moisture available to the tree is greater. The poorly drained mineral soils support a tree growth principally of the elm-ash-silver-maple type.

There are two dry-prairie areas near Battle Creek: one just southwest of the city, called Goguac Prairie, and the other about ten miles southwest, known as Climax Prairie. These areas were covered principally by tall prairie grasses, with a scattering of bur oaks. The explanation of the presence of these prairies in southwestern Michigan seems to lie in a complicated mixture of natural and cultural conditions. The change of climate which caused the retreat of the glacier apparently continued for some centuries after the Pleistocene period and produced a much more xeric condition than that of the present day. It appears that under these favorable circumstances the prairie, now extant in Illinois and westward, reached far north into Michigan.¹⁹ A second change in climate²⁰ resulted in a condition fostering the present forest cover, and the prairies such as the Goguac and the Climax are existent as relict forms.

These natural conditions favorable to grass growth were supplemented by certain practices of the Indians who inhabited the area. To judge from the Indian remains, aboriginal occupation of many of the prairies was relatively intensive for Indian standards. It was generally the custom to burn the grasses of the prairies in the fall to drive whatever game existed there into the near-by woods, where it could be more easily hunted.²¹ This practice encouraged the continuance of grass rather than the growth of trees and augmented the natural conditions which favored its existence. The

¹⁷ Baulig, Henri, *Amérique septentrionale, Géographie universelle*, Tome XIII, edited by P. Vidal de la Blache and L. Gallois (Paris, 1935), colored map: "Les Formes de végétation aux États Unis et dans le sud du Canada," between pages 106 and 107.

¹⁸ Leverett and Taylor, *op. cit.*, p. 180; see also Moon, J. W., Veatch, J. O., Wouser, C. H., and Pasco, R. E., *Soil Survey of Eaton County, Michigan*, Bur. Chem. and Soils, U. S. Dept. Agric., Series 1930, No. 10, p. 3.

¹⁹ Gleason, H. H., "The Vegetational History of the Middle West," *Ann. Assn. Am. Geog.*, 12: 39-85. 1922.

²⁰ Sears, P. B., "The Archaeology of Environment in Eastern North America," *Am. Anthropol.*, N. S., 34: 612-614. 1932.

²¹ Gleason, *op. cit.*, pp. 80-81.

probable importance of the custom seems borne out by the fact that certain uncropped prairies or openings became covered by upland forest after the arrival of the white men.²²

The first settlers, having learned the use and the advantages of prairie land in Illinois and western Indiana, were attracted to these dry prairies. The land was not so difficult to clear as the forest, could immediately be plowed, was of rich soil with a high humus content, and was especially suitable for wheat, the important pioneer cash crop.²³

The remaining form of original vegetation is the so-called "wet prairie" or swamp. These soils were unsuitable for pioneer agriculture, but they did provide fields for pasture and hay which did not need an axe to clear them. Many of the early settlements made in the neighborhood of these swamps were unfortunate because the undrained areas fostered the rapid spread of malaria, and the pioneers in such sections usually suffered most from the disease.²⁴

CONCLUSION

Battle Creek has been described as a city with four separate functions: manufacturing, commerce, health, and education, represented respectively by the factories, the commercial core, the sanitarium, and the college. These cores and the other functional areas of the city have been delineated, and their spatial relationships have been indicated. The fundament has also been discussed, and the landforms and the drainage have been shown to be the results of glacial deposition and erosion. The vegetation is correlated in a general way with climate and in detail with surficial conditions. The prairies, forms of an earlier climate, still further complicate the vegetational pattern. The relationships existing between the present-day city and the fundament, such as the distribution of street patterns and the location of transportation areas, have been pointed out.

There still remain, however, many areas the presence of which has not been discussed. These are for the most part forms of an earlier stage of sequent occupance. Just as the presence of the prairies,

²² Beals, W. L., "Some Changes Now Taking Place in a Forest of Oak Openings," *Fourth Ann. Rep. Mich. Acad. Sci.* (1902), pp. 107-108.

²³ Veatch, J. O., "The Dry Prairies of Michigan," *Pap. Mich. Acad. Sci., Arts, and Letters*, 8 (1927): 269-278. 1928.

²⁴ Comstock, O. C., "History of Calhoun County . . .," *Michigan Pioneer Collections*, 2: 218-220. 1880.

such as the Goguac and the Climax, cannot be explained in terms of present-day climate and surface, so certain urban forms cannot be explained in terms of present-day use. In a later paper the author will trace the sequent occupance of Battle Creek and will show the relationship between it and certain existing urban forms. Likewise the relationship which each of the cores and the city as a whole bear to the surrounding areas which they serve will be described.

STATE TEACHERS COLLEGE
MURFREESBORO, TENNESSEE



FIG. 1. The Kellogg Company



FIG. 2. The Postum Company



FIG. 3. The American Steam Pump Company, at edge of commercial core. Note older style of architecture as compared with that shown in Figures 1-2



FIG. 1. The Oliver Farm Equipment Company. Note older style of architecture as compared with that shown in Plate I, Figures 1-2



FIG. 2. View of shopping district of Battle Creek



FIG. 3. Second-class commercial district. Compare with Figure 2



FIG. 1. Concentration of outlying commercial areas on road to Verona



FIG. 2. Detail of front view of Battle Creek Sanitarium



FIG. 3. View of one of the newer buildings of Battle Creek College



FIG. 1. View of third-class residence near commercial core. From architectural style it was judged to be a decadent area



FIG. 2. View of third-class residence associated with industry in northeastern part of city. Note poor construction of houses as compared with those shown in Figure 1



FIG. 3. View of first-class residence northeast of commercial core



FIG. 1. View of suburban residence in northern part of Battle Creek



FIG. 2. View of second-class residence



FIG. 3. An outcropping of Marshall sandstone in old glacial channel in north-eastern part of Battle Creek

BATTLE CREEK: A STUDY IN URBAN GEOGRAPHY

PART II. ORIGIN AND DEVELOPMENT, AND FUNCTIONAL INTERPRETATION

H. THOMPSON STRAW

INTRODUCTION

IN A previous paper¹ the author described the present-day city of Battle Creek and its fundament. It was seen that the city possesses four separate functions: manufacturing, commerce, health, and education. The landforms and drainage, to which so many urban patterns within the city are related, were shown to be the result of glacial deposition and erosion. Natural vegetation was correlated in a general way with climate, but in detail was more closely related to surficial features, especially different types of glacial deposition.

There remains, however, another set of factors, largely cultural, which must also be considered. Just as it was necessary for a complete understanding of the city to have an understanding of the fundament which underlies and surrounds it, so it is equally essential to trace its development, since many parts of the present-day pattern are relict forms of an earlier occupancy.

ORIGIN AND DEVELOPMENT

PIONEER SETTLEMENT

Battle Creek was settled in 1831. Prior to this the Indians had established certain lines of travel across Michigan. In the first attempts to build routes west of Detroit, however, the white men disregarded these earlier lines of travel and planned to lay the

¹ Straw, H. Thompson, "Battle Creek: A Study in Urban Geography. Part I. Present-Day City and Fundament," *Pap. Mich. Acad. Sci., Arts, and Letters*, 23 (1937): 367-384. 1938. This will be referred to hereafter merely as Part I.

roads in a straight course, which thus conformed to the rectangular grid pattern common through the Old Northwest Territory. This, it was soon found, would necessitate a too-frequent filling of swampy areas, and the plan was abandoned.² Instead, three principal roads were laid approximating the three Indian trails known as the Grand River, the St. Joseph, and the Sauk. They were called the Grand

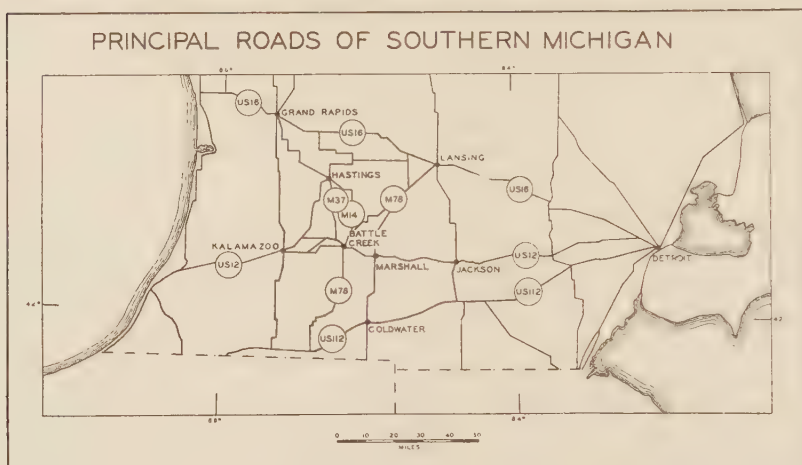


Fig. 1

State routes are indicated by the letter M; national routes, by the letters US

River Route, now U.S.-16; the Old Territorial Road, now U.S.-12; and the Chicago Trail, now U.S.-112 (Fig. 1). Battle Creek was located on the Old Territorial Road.

The population which settled the area about the present city came from two sources. As would be expected, the larger numbers traveled by way of Detroit and over the Old Territorial Road, but there was also a migration from the earlier-settled prairie regions of Illinois and Indiana. These settlers had learned the value of prairie land for farming and were expanding into southwestern Michigan, making their agricultural settlements upon such relict prairies as Goguac and Climax.

The first plan, although not the first actual settlement, of the present site of Battle Creek was based upon the presence of water

² Moore, V. L., "A Typical Pioneer Family," *Mich. Hist. Mag.*, 13: 459-460. 1929.

power. In 1830 the land which is now Calhoun County was offered for sale,³ and in 1831 Sands McCamly and George Redfield, appreciating the value of the site for power, decided to purchase the land which lies in the valley about the convergence of the two rivers.⁴ When these two men arrived at the land office in White Pigeon they found three others there, intent upon making the same purchase. Financial agreements were completed, the area was bought by the entire group, and plans were laid for its development. But these plans were never carried out by this group, and the first actual settlement within the present city limits was not in the valley and because of water power, but on Goguac Prairie and as an agricultural settlement similar to those which have already been described.⁵ A few weeks later, however, the first house within the original plat of the village was built, and water power was put into use in 1837.

Many difficulties were to be experienced in the development of this water power. It was necessary to dig a millrace from the Kalamazoo River to Battle Creek (from which the city was named). During the greatest development of water power the race had a wing which paralleled the Creek a short distance from that stream. Soon after the inauguration of water power it was found that new dams were needed to impound more water, but the new dams created millponds and flooded the agricultural area outside the city, and involved in extensive law suits those who controlled the millrace.⁶ Some of the buildings of the area about the race were built over it, as they are today, but being of poorer construction they collapsed within a few years. At the height of its use the race served some eighteen firms. The wing of the race never supplied more than three and was closed after a short time.

Most of the industries dependent upon the race were of the pioneer type and consisted of those which processed local raw materials. There were planing mills which used local forest products, gristmills for local grain, wool-carding mills for the local fleec, and a wagon factory which was to exist for some time after the others had disappeared.

³ Comstock, O. C., "History of Calhoun County . . .," *Mich. Pioneer Collections*, 2: 193. 1880.

⁴ Article in *Detroit Post and Tribune*, reprinted in *Mich. Pioneer Collections*, 3: 351. 1881.

⁵ Part I, p. 383.

⁶ Roberts, E. W., *Pioneer Days in Old Battle Creek*. Battle Creek, 1931.

The commercial core of these times was largely restricted to a single street, the Old Territorial Road. Since part of the road ran then, as does its counterpart of today, roughly parallel to the Creek and the Kalamazoo River, it placed the location of the areas devoted to commerce in close proximity to the early factories.

With the coming of the railroad came also competition from the outside. The pioneer industries could not withstand this and declined. Their decline resulted in the general abandonment of the millrace, until today it is used in but one or two places (Pl. I, Fig. 1).

THE COMING OF THE RAILROAD

The coming of the railroad, which brought failure to the early industries by introducing outside competition, assured the city of continued growth and development. In 1835 Verona, now a part of the northeastern section of Battle Creek, was started as an independent settlement, also based on water power along the Creek. By 1836 it was of a size similar to that of the village of Battle Creek, but when in 1845 the Michigan Central Railroad was laid to Battle Creek and not to Verona, this latter settlement failed to survive the competition of its neighbor ⁷ (Pl. I, Fig. 3).

The Michigan Central Railroad was one of three lines inaugurated in southern Michigan in 1849. Each of these lines followed one of the Indian trails and hence paralleled one of the then existent territorial roads. Early railroads were built more cheaply than are those of today. The rails consisted of wooden bars overlain by strap iron, and a graded roadbed was less necessary than it is today, since the rates of speed were considerably slower. A route which had the least grade was followed, no matter how devious, rather than one more direct which would require the expenditure of money for cutting and filling.

The present rail location of Battle Creek is in part the result of this early adjustment. We have already mentioned the northern bend of the Michigan Central Railroad immediately outside the eastern border of the city and its close relation to the local grade.⁸ The same railroad makes another northern bend in the center of

⁷ Van Buren, A. D. P., "Pen Pictures of Our Pioneers — Heroic but Ineffectual Struggle of Verona to Outstrip Battle Creek," *Mich. Pioneer Collections*, 5: 259-272. 1884.

⁸ Part I, p. 374.

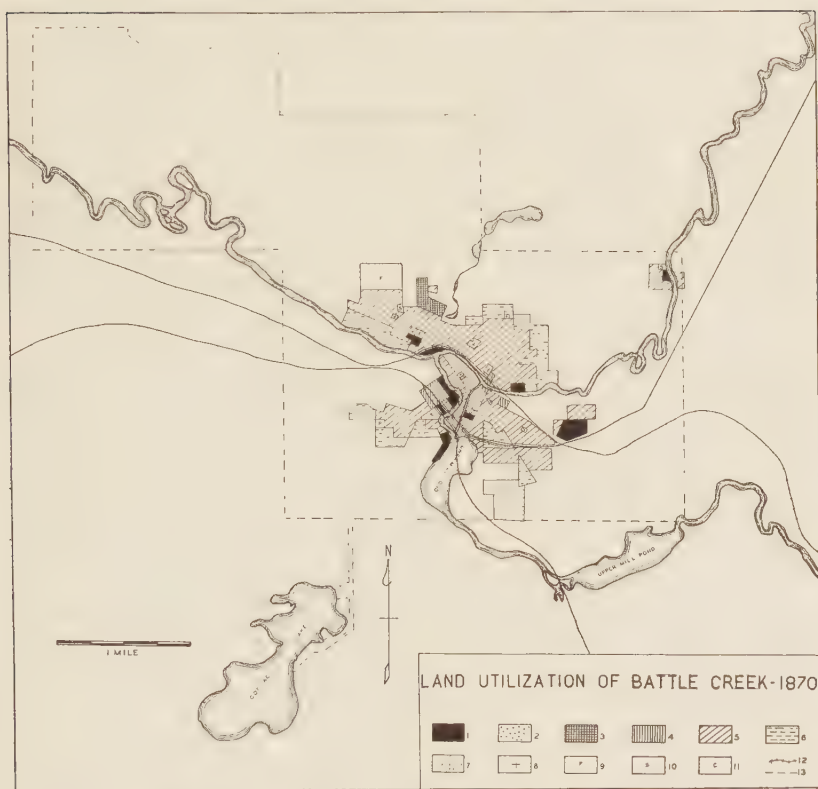


FIG. 2

KEY TO SYMBOLS

- | | | |
|-----------------------------------|-----------------------|-------------------------|
| 1. Industries | 5. Urban residence | 10. School |
| 2. Commercial core | 6. Suburban residence | 11. City property |
| 3. Sanitarium | 7. Cemetery | 12. Railroad |
| 4. Land devoted to transportation | 8. Church | 13. Present city limits |
| 9. Park | | |

the city. It has been said that this bend was introduced because State Senator McCamly wished the railroad to pass by his residence, now the Nichols Hospital.⁹ At the time at which it was laid, however, the railroad fitted rather admirably into the urban pattern. If its location was due solely to a caprice of a state senator, that caprice

⁹ Printed material on reverse side of Map of the City of Battle Creek, published by the *Enquirer and News*, Battle Creek, n.d.

was an unusually fortunate one, for the location enabled the railroad to serve easily both the commercial core and the factory areas.

By 1870 Battle Creek had grown to a town of nearly six thousand population. The land utilization of the city at that time can be seen on Figure 2. The early industries along the Creek have disappeared, and their place has been taken by the expanding commercial core. The industrial sites of 1870, which were then located at or near the outskirts of the urban unit, are for the most part still occupied. They are represented by the small industrial areas now within the commercial core. Being near the large agricultural market of the Middle West, many of them made machinery; but there were no food industries. There was a second railroad serving Battle Creek which entered from the northeast and thus made the rail pattern similar to that of today. The remnants of the Verona settlement can be seen to the northeast. At the northern part of the city the sanitarium stood, as it does now, but the college was not to be founded until four years later. In the northeastern part of the occupied area may be seen a small church with surrounding cemetery. This was the church of the Quakers — those Quakers who had established a few years earlier, prior to the Civil War, the Battle Creek station on the "underground railroad." As a result of this activity of helping Southern slaves to escape the nucleus of the present Negro population of the city was formed.¹⁰

THE CULTURAL HERITAGE OF THE SEVENTH-DAY ADVENTISTS

One of the most important cultural ingredients brought to Battle Creek by those who settled there, and the one which perhaps has done most to shape the present city, was that of the Seventh-Day Adventists. The years from 1800 to about 1840 saw the rise in the United States of a number of religious and social sects, each intent upon reforming and regulating the lives of its converts. Among these sects were the Seventh-Day Adventists. Organized in New England in 1855, the headquarters and publication offices were later moved to Battle Creek by the leader, Elder White. The sect believed in abstinence from liquor, coffee, tea, pork, and richly seasoned foods, and advocated the use of cereals, fruits, and vegetables. In 1866 a sanitarium incorporating these ideas of diet was founded by the sect

¹⁰ Barnes, C. E., "Battle Creek as a Station on the Underground Railway," *Mich. Pioneer Collections*, 38: 279-285. 1912.

at the present site of the Battle Creek Sanitarium,¹¹ but it was not until ten years later that, under the direction of Dr. J. H. Kellogg, the institution began to grow to its present size and importance. Many ideas of diet similar to those of the Seventh-Day Adventists are still practiced in the sanitarium.

In 1874 Battle Creek College was founded. At first it was designed to instruct Seventh-Day Adventist ministers.¹² Later it became closely allied with the sanitarium and, as we have seen,¹³ this adherence persists today.

The most far-reaching effect of the Seventh-Day Adventists upon the city was not directly, by establishing their institutions, but indirectly, in the development of the food factories. During the 1890's C. W. Post came to the sanitarium for treatment. While there he received from Dr. Kellogg the idea that coffee was harmful. In 1895 Post started the manufacture of Postum, a coffee substitute.¹⁴ In 1889 Dr. Kellogg had built a food factory to make the special food preparations used at the sanitarium,¹⁵ but Post was the first to place a food factory at Battle Creek upon a commercial basis. The Postum Company prospered, and during the years from 1900 to 1905 some twenty or thirty other food companies were attracted to the city. Among these were the Cero-Fruito Food Company, the Malta Vita Pure Food Company, the Battle Creek Food Company, and the Malt-Too Flake Food Company. Now only four remain: the Battle Creek Food Company, which makes sanitarium diet items, but which also sells upon the general market; the Postum Company; the Kellogg Company; and the Ralston Purina Company.

Prices of the cereal and food products are obviously based not so much upon the intrinsic value of the food as upon its convenient form. Advertising is therefore imperative. Post was one of the foremost advertisers of his day,¹⁶ as is shown by the fact that in 1925 the Postum Company was given the Harvard Advertising Award for that year.

This advertising has two effects upon the city. First, it swells

¹¹ Henshaw, D. M., "Battle Creek, Headquarters for Health," *The Mag. of Mich.*, 2 (3) : 4-6, 22. 1930.

¹² Utley, H. N., and Cutcheon, B. M., *Michigan as a Province, Territory, and State, the Twenty-sixth Member of the Federal Union* (Lansing, 1906), IV : 342.

¹³ Part I, p. 374.

¹⁴ "Let Them Eat Cake, or the Story of General Foods," *Fortune*, 10 (Oct. issue) : 70-71. 1934.

¹⁵ Henshaw, *op. cit.*, p. 6.

¹⁶ See note 14.

the United States mails through the use of coupons for samples, and, secondly, it makes the city very well known and gives to the outsider a distorted idea of the relative importance of the food industries in the city.

After providing so many of the ideas, the concrete expressions of which have been incorporated into the city structure, the headquarters of the Seventh-Day Adventist Church was moved to Washington in 1903. Today only the Tabernacle (Pl. I, Fig. 2) remains. The sanitarium, however, still maintains a connection with the church.

THE COMING OF THE AUTOMOBILE

Just as the coming of the railroad changed the pattern of the city, so the development of motor transportation made and is making changes. Perhaps the most striking one is that in the roads. All cities of any considerable size in southern Michigan are connected by lanes of concrete or asphalt (Fig. 1). It has been noted that the location of these main trunk lines is approximately the same as that of the Indian trails and the territorial roads. Thus, from Battle Creek the two roads leading to Kalamazoo become routes U.S.-12 and M.-96; the route to Verona, M. -78; the route to Marshall, U.S.-12; and two new routes, one to Athens and the other to Hastings, M.-78 and M.-37, respectively.

There are also numerous minor changes which the development of motor transportation has wrought. One is the paving of streets which parallel the chief routes of travel through the city and divert a part of the traffic from the commercial core, through which the main arteries of travel pass. Another is from streetcar to bus, which also helps eliminate traffic jams. Furthermore, the interurban line of twenty years ago no longer exists, for the competition with automotive traffic led to its decline and abandonment. Only the unused roadbed paralleling U.S.-12 remains.

One of the most important effects of the automobile has been the extension of the surrounding area which is tributary to the commercial core. It is impossible to trace this extension, but the difference in the amount of area occupied by this core in 1870 (Fig. 2) and that occupied today (Part I, Fig. 4) roughly indicates that the tributary area has grown. Another indication is that Battle Creek, as we shall see later, has become one of the trading centers of southern Michigan.

Today the railroads, also, are feeling the competition of the roads, although from trucks more than from automobiles. Trucking in Battle Creek, as is generally true elsewhere, is a business of small individual companies, and figures concerning the tonnage carried are lacking. Many of the factories which produce goods of large bulk, such as machinery, will probably continue to patronize the railroads. Others, such as food factories, can and do use trucks. It is still too early to try to predict what changes, if any, this will make within the patterns of the city itself.

POPULATION GROWTH

The growth of population to the present number of some forty-three thousand is apparent in the accompanying graph (Fig. 3). There are no figures prior to 1850, so that the population growth

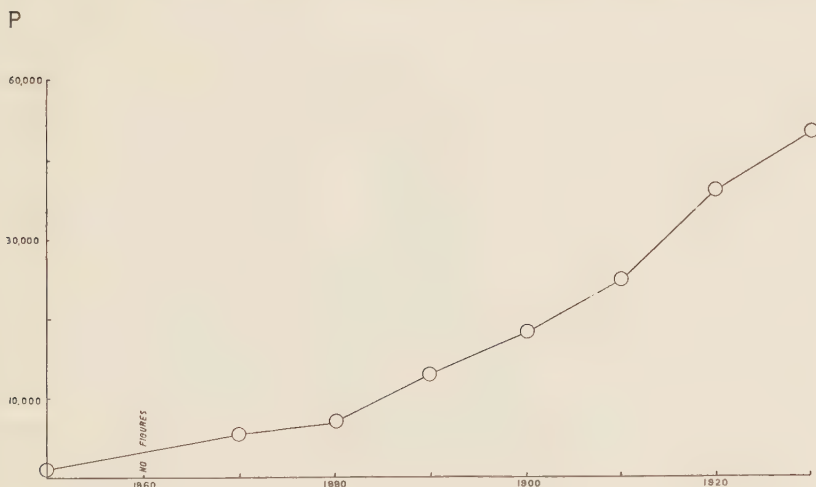


FIG. 3. Population graph of Battle Creek

of the first stage cannot be included. The population figure of 1850, however, about one thousand, indicates a slow growth for the first twenty years. The second stage, till 1880, was characterized by a somewhat more rapid rise. The decade from 1880 to 1890 marked an increase of population in many manufacturing cities of southern Michigan. Battle Creek shared in this increase, and the development of the cereal-processing industries continued it after 1890. The

war decade, 1910 to 1920, showed an accelerated growth in Battle Creek, as well as in most other American manufacturing cities. The last decade has had what is apparently a more normal increase for the city.

FUNCTIONAL INTERPRETATION

We have already described the functional areas of Battle Creek and noted their areal relationship.¹⁷ Each of them derives its form, in part at least, from the peculiarities of its site and the relationship which it bears to the urban forms of the past. In order to understand completely the city of today it is necessary still to consider the importance of each of these areas and the relationship which it bears to its tributary area outside the city proper.

MANUFACTURING

The importance of manufacturing to the city is plainly shown from the census figures (Fig. 4). Nearly one half of the people living in Battle Creek derive their incomes from the manufacturing and mechanical industries. The number of those who do so is in reality larger than is indicated by the census figures, for many of the clerical occupations are associated with manufacturing.

The relative importance of the cereal-processing industries can be found by comparing the percentage of laborers and operators of these industries with those of the steel-machinery industry, the presence of which is less well known outside the city itself. Although 13 per cent of the people employed in the manufacturing and the mechanical industries are in those of cereal processing as laborers and operators, another group nearly as large, 11 per cent,¹⁸ are so employed in the steel-machinery industries. Therefore it would seem that, on the basis of the number of persons employed, the importance of the cereal industries to Battle Creek has been exaggerated in the minds of the general public.

A similar picture can be had if we consider the relative area occupied by the cereal industries. There are, as we have seen, three of these industries in the city: the W. K. Kellogg Company, the Postum Company, and the Ralston Purina Company. In Battle Creek all industry, including that within and without the city limits,

¹⁷ Part I, pp. 371-376.

¹⁸ *Census of the United States*, No. 15, *Population*, Vol. IV, *Occupations by States*, Dept. Comm., Bur. Census (Washington, 1931), pp. 790-792.

occupies about one hundred and fifty acres. Of this, only 23 per cent is taken up by the cereal-processing industries. If we add to them the Battle Creek Food Company, which deals in a much wider range of food preparations than merely cereals, this percentage is increased

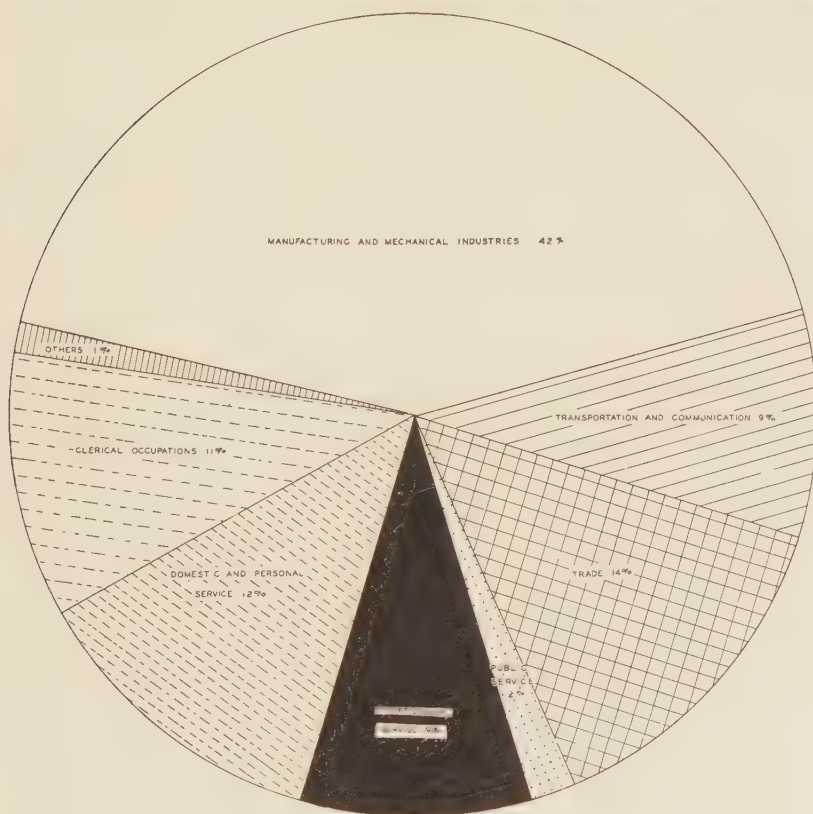


FIG. 4. Occupations of Battle Creek, 1930

to 25. Therefore, on this basis also it would seem that the importance of the cereal-processing industries has been exaggerated. Battle Creek is by no means a city of one industry.

The apparent discrepancy between the percentage of area occupied by the food industries and the percentage of wage earners of the city employed can be explained, in part at least, by the greater use of automatic machines in the food industries. "Food untouched

by human hands" means a smaller number of persons employed. Still another reason for this discrepancy is that the food factories are newer and are located nearer the outskirts of the present city. Consequently they occupy larger units of land in proportion to the size of the factory than do the older steel-machinery industries, many of which are crowded into the present commercial core (cf. Figs. 1 and 3 of Pl. I, Part I).

It is impossible to delineate accurately the region of economic contact of manufacturing. The food factories, by their paid advertising in such magazines as the *Saturday Evening Post* and the *National Geographic Magazine*, indicate their markets to be nationwide. The steel products have a smaller market, since they are restricted for the most part to an indefinite area in the Middle West.

COMMERCE

The activity of trade ranks next to that of manufacturing in percentage of persons employed (Fig. 4). Considering the commercial core and the outlying commercial areas, there are 704 stores in Battle Creek, with a total yearly net sales of \$33,260,000.¹⁹ Besides serving both the immediate urban community and a surrounding rural area, the eleven department stores, four of which, on the basis of their financial rating, are considered "leading stores,"²⁰ indicate that Battle Creek also serves a larger retail shopping area. This area has been estimated to cover 1,100 square miles and to have a population of 110,000.²¹ Most of the stores which serve it are located within the first-class commercial area (Part I, Fig. 5).

The extent of the surrounding tributary rural area is shown on the map, Figure 5.²² It depends upon the conditions of transportation and the location near by of competitive urban centers. This latter factor is of more importance, since roads throughout the surrounding rural areas are for the most part excellent. The proximity of Marshall, Kalamazoo, and Hastings restricts the primary

¹⁹ *Census of the United States*, No. 15, *Retail Distribution in the United States*, Dept. Comm., Bur. Census (Washington, 1931), pp. 58-59.

²⁰ *Retail Shopping Areas*, compiled by J. Walter Thompson Co. (New York, 1927), p. 82.

²¹ *Population and Its Distribution*, compiled by J. Walter Thompson Co. (New York, 1926), p. 214.

²² Areal boundaries were determined by the road turnings. For a delineation of this method see S. D. Dodge, "Bureau and the Princeton Community," *Ann. Assn. Am. Geog.*, 22: 174-182. 1932.

trade area of Battle Creek on the east, west, and north, respectively. At the south it probably is the competitive influence of the market towns along U.S.-112 which is the determining factor.

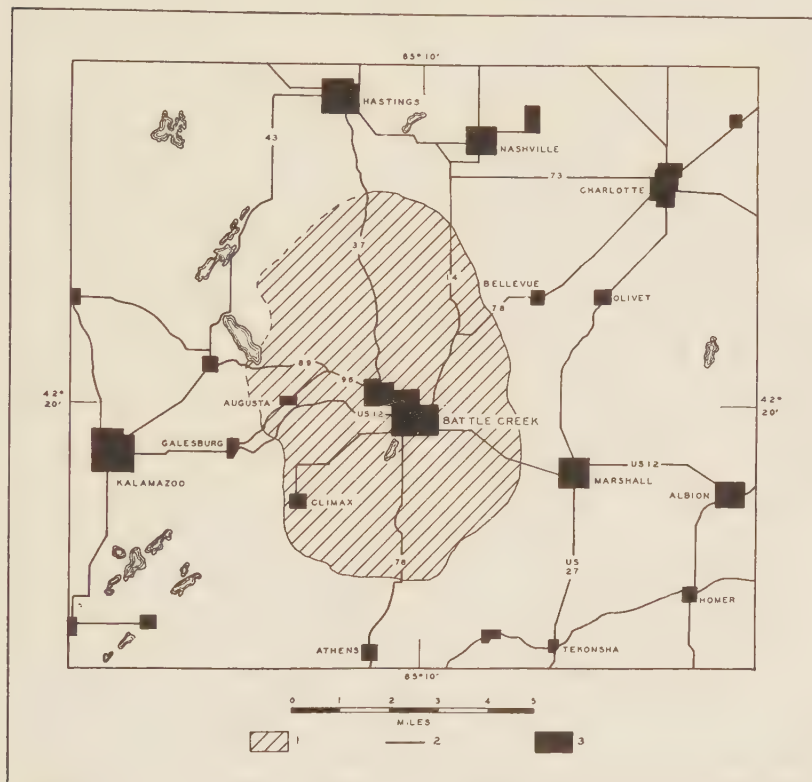


FIG. 5. The umland of Battle Creek

KEY TO SYMBOLS

- | | | |
|-----------|--------------------|----------------|
| 1. Umland | 2. Principal roads | 3. Urban areas |
|-----------|--------------------|----------------|

THE SANITARIUM AND THE COLLEGE

The sanitarium's reputation, which has helped to make Battle Creek so well known, is not based primarily upon the practice of a specialized surgery and medicine, but rather upon what is termed "healthful living." This includes proper rest, food, and exercise. It is, therefore, the many minor and not the major ailments of man-

kind which the sanitarium specializes in treating, although it does maintain a well-equipped surgical and medical staff. It is natural, then, that there should be a great fluctuation in the number of patients. In times of economic depression, such as the early 1930's experienced, the number is usually low.

Certainly of all the four functions performed by Battle Creek that represented by the college is, viewed from the economic standpoint, the least important. Since the college possesses but few students and is completely overshadowed both physically and in importance by the sanitarium with which it has so long been, and still is, intimately connected, it is mentioned among the cores of Battle Creek only in order fully to complete the urban picture.

The areas served by the college and the sanitarium have indefinite boundaries, as does that served by the factories. The college, like most small ones, depends largely upon the surrounding areas for its students, although a few come from considerable distances. The sanitarium, with its wide reputation, has a much larger area from which it obtains its clientele. But here again the boundaries are indistinct.

THE CITY EXCLUSIVE OF THE CORES

Within the residence areas of a large city it is usual to expect a shift in land use. What at an earlier date constitutes first- and second-class residence district is encroached upon by an expanding commercial or industrial area, and the dwellings become third-class residence. As we have seen, there are some examples of this in Battle Creek, especially near the commercial core. To judge from the appearance of the buildings, such changes are not extensive, however.

In 1873 there was published a map of Battle Creek²³ which indicates not only the size of lots but the shape and the size of houses. As nearly as can be determined, the distribution of residence classes was very similar to that of today. In 1878 the *Detroit Post and Tribune*²⁴ stated of Battle Creek: "The finest residence street takes the name of Maple from Michigan's favorite shade tree." This is the first-class residence area extending northeast from the commercial core. Therefore it would seem that to date this usual shift of classes of residence has not been completed in Battle Creek, but

²³ Beers, F. W., *Atlas of Calhoun County, Michigan*. Philadelphia, 1873.

²⁴ Reprinted in *Mich. Pioneer Collections*, 3:351. 1881.

the process has evidently been taking place during recent years. This appears further substantiated by the unusually high percentage of suburban residence (39 per cent of total residence area), which is almost equal to the area occupied by second-class residence. Probably the shift was interrupted by the last few depression years and doubtless will be resumed with normal times.

It has often been stated that the ideal percentage of a city area to be devoted to parks is 10²⁵ and that it must have an even distribution, so that it may be accessible to all parts of the city. The percentage of land in parks at Battle Creek (8.4), although not ideal, is considerably better than that of many cities. The distribution could be improved by establishing an additional, larger park in an area accessible to the southeastern part of the city.

It is perhaps natural that in a city whose residence areas are in a state of flux, as we have seen those of Battle Creek to be, there should be a considerable area of subdivisions. It becomes unfortunate, however, when the area is much larger than is likely to be absorbed by actual use within a few years at most.²⁶ There are surrounding the city approximately three and one-eighth square miles of subdivisions which are practically unused.²⁷ If we consider only the area within the city limits and subtract from it that of the wasteland and the agricultural land, the average density of the utilized urban area per square mile is 3,413 persons. If, then, the city were to expand into these subdivisions, maintaining its present density, it would have to increase its population by some 17,456 persons. This is more than twice the growth of the city in the decade from 1920 to 1930, and is three fourths greater than the increase in population made in the preceding decade, which was phenomenal and unique for the city. Therefore, it would seem doubtful whether the total area now in subdivisions will be absorbed by the city within a short period of years, if, indeed, at all. This doubt is strengthened when one remembers the large percentage of the total urban area now in suburban residence, which would naturally tend to be fully utilized before new developments could be absorbed.

²⁵ Bartholomew, Harland, *Urban Land Uses . . .*, Harvard City Planning Studies, Vol. IV (Cambridge, 1932), p. 110.

²⁶ McKenzie, R. D., *The Metropolitan Community* (New York, 1933), p. 107, fig. 6.

²⁷ Part I, p. 376.

A COMPARISON OF LAND USES WITHIN BATTLE CREEK

The percentages of land uses within Battle Creek and Hillsdale and within other cities which Bartholomew gives as having a population of from 5,000 to 50,000 are shown in Figure 6. Battle Creek, with a population of 42,573, is primarily a manufacturing city. Hillsdale, with a population of 5,896, is, as has already been stated,²⁸

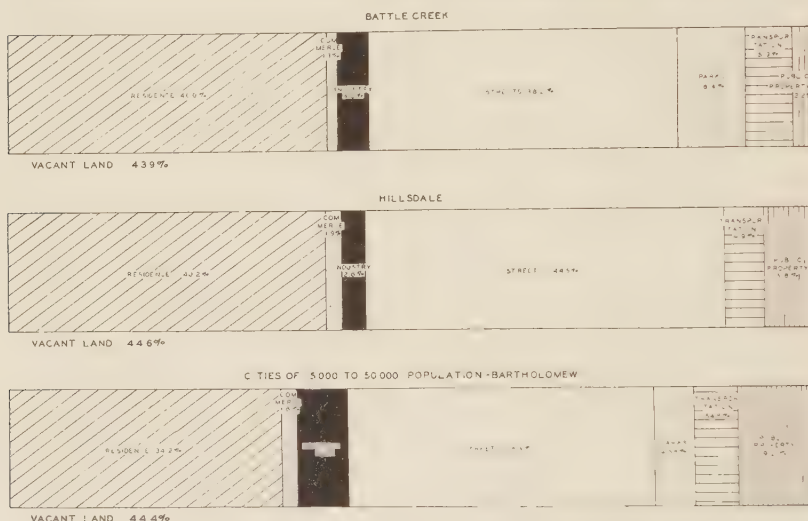


FIG. 6. Percentages of land uses within Battle Creek and Hillsdale and within other cities of from 5,000 to 50,000 population as given by Bartholomew

primarily a trading center. The cities from Bartholomew are classified by the population numbers, irrespective of the principal function. In each case the unit taken was the geographic, not the political, city.

It will be noted that the percentages of area as established by Bartholomew are exceeded in Battle Creek in the following items: residence, parks, and transportation. The large percentage of residence can be explained by the unusually large amount of suburban land. The parks, as was pointed out, more nearly approach the ideal than do those of many other cities. The slightly larger area devoted to transportation can be explained on the basis that Battle Creek is the location of the shops of the Grand Trunk Railroad. Surprisingly

²⁸ Part I, p. 367.

enough, the city, noted for its manufacturing, has but a small area given over to this activity. It is doubtless explained by the fact that many of the older factories are located within the present-day commercial core and occupy less space than those built later, farther away from the center of the city (Part I, Fig. 4).

A comparison of the percentages of land uses in Battle Creek and in Hillsdale shows that in Hillsdale industry occupies a much smaller part and commerce a considerably larger part. It is as would be expected in the case of a predominately commercial town. The percentages of area in residence and streets are also greater. In a smaller town, with larger units of land per home and smaller blocks, this is not unusual.

CONCLUSION

It has been shown that Battle Creek's reputation as a health center and as a producer of cereal preparations is in reality somewhat of a distortion of the actual conditions. Manufacturing is of prime importance, but it is not confined to the production of food, for the iron and steel machinery shops employ nearly as many persons, and there are other industries as well. The sanitarium, although of importance, is outranked both in area and in number of persons employed by the commercial core, which serves so large an outlying area.

It has also been shown that the original settlement was an adjustment to the natural features in terms of the culture of that time. Although many of these earlier forms exist, in part at least, in the present-day morphology, each cultural change, whether a new means of transportation or the inclusion of a new group, such as the Seventh-Day Adventist, has wrought structural changes in the city. Interestingly enough, the cereal processing and the sanitarium seem to have been almost entirely the product of the group's culture and to be totally unrelated to any natural advantages.

It is impossible to prognosticate the future of the city with any degree of accuracy. Certain changes, such as those in the residence areas and those resulting from the increasing use of trucks in transportation, are evident today and will doubtless continue. But the future success of each individual part of all the cores, the individual factory, store, sanitarium, or college, will probably ultimately depend, as its present success has depended, upon the initiative and the energy of the individual man or of the men who are in charge of it.

ACKNOWLEDGMENTS

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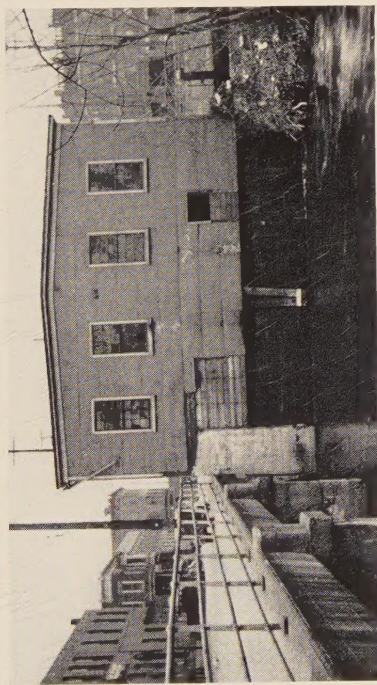


FIG. 1. One of the few evidences of the former use of water power in Battle Creek



FIG. 3. The abandoned millrace at Verona, now a part of the city of Battle Creek

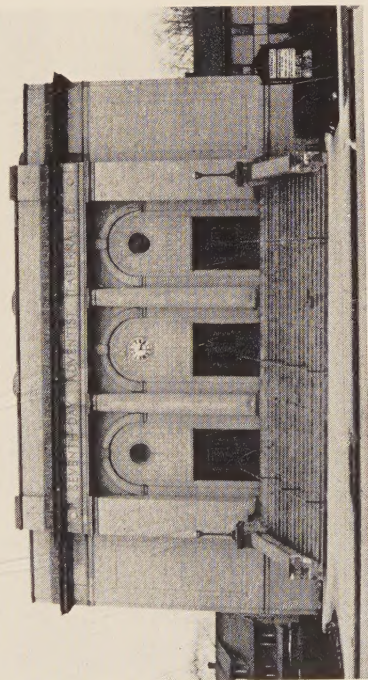


FIG. 2. Seventh-Day Adventist Tabernacle

